

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. : 10/579,775 Confirmation No. : 5722
First Named Inventor : Anthony Peter HULBERT
Filed : November 18, 2004
TC/A.U. : 2617
Examiner : Amanuel Lebassi
Docket No. : 038819.57537US
Title : Method of Communication in a Time Division Duplex (TDD)
Satellite Communication System

REPLY

Mail Stop AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Office Action dated September 11, 2009, reconsideration and allowance of the above-identified application are respectfully requested. **An extension of the deadline for response to the Office Action is respectfully requested pursuant to 37 C.F.R. § 1.136(a) and the appropriate fee is submitted herewith.**

Claims 1-12 are rejected for obviousness under 35 U.S.C. § 103(a) in view of the combination of U.S. Patent No. 6,249,677 to Noerpel et al ("Noerpel") and U.S. Patent No. 6,671,292 to Haartsen ("Haartsen"). This ground of rejection is respectfully traversed.

Applicants disclose and claim novel and inventive methods for implementing time division duplexing (TDD)/time division multiple access (TDMA) communication in satellite systems. As previously discussed, conventional wisdom was that due to the minimum propagation delay of 240 ms in satellite communication systems it was impractical to use TDD and instead

satellite communication systems typically employed frequency division duplexing (FDD). Applicants' novel and inventive method allows the use of TDD in satellite communication systems by, *inter alia*, allowing a first terminal to transmit over a particular frequency at the same time as a second terminal is allowed to receive over that same particular frequency so long as the first and second terminals are spaced apart a predetermined distance.

The combination of Noerpel and Haartsen does not disclose or suggest using TDD/TDMA in a satellite communication system or doing so by spacing apart a first and second terminal that respectively transmit and receive over the same frequency at the same time.

Noerpel discloses a satellite system that uses FDD, and not TDD. Additionally, Noerpel does not disclose spacing apart a first and second terminal that respectively transmit and receive over the same frequency at the same time.

Haartsen, in contrast to Noerpel and Applicants' claims, is directed to a terrestrial-based communication system and not a satellite communication system. Unlike the use of TDD/TDMA as required by Applicants' claims, Haartsen uses frequency hopping (FH)/TDD. There is no disclosure or suggestion in Haartsen that the FH/TDD system can be employed with a satellite system such as that disclosed by Noerpel. Nor is there any disclosure or suggestion that when Noerpel's FDD system is combined with Haartsen's FH/TDD system, that the resulting system would employ TDD/TDMA as required by Applicants' claims.

Additionally, the FH/TDD communication technique of Haartsen is disclosed as being used in a short-range radio system, whereas Noerpel and Applicants' claims relate to satellite systems. There is nothing in Haartsen indicating that the FH/TDD communication technique of a short-range radio system can be used in a satellite communication system. This is particularly true in view of the conventional wisdom that TDD would not be appropriate for use in satellite communication systems. In fact, there is nothing in Noerpel or Haartsen indicating that TDD can be employed in a satellite communication system.

Accordingly, there is no disclosure or suggestion to combine Noerpel and Haartsen to result in a satellite system that uses TDD/TDMA as required by Applicants' claims. Instead, one skilled in the art would have implemented an FDD system for satellite communications in accordance with the conventional wisdom at the time of the invention.

The Office Action recognizes that Noerpel does not disclose the spacing apart of two terminals that communicate with a satellite, and instead relies upon Haartsen for this disclosure. First, as discussed above, Haartsen is directed to a terrestrial-based communication system and not a satellite-based communication system as required by Applicants' claims. Second, Haartsen appears to be directed to a peer-to-peer short-range communication system, such as a Bluetooth communication system. Thus, Haartsen does not disclose or suggest two terminals that communicate with a satellite or even two terminals that

communication with any type of access point, such as a base station. As such, Haartsen, like Noerpel, does not disclose or suggest that “when the transmit time slot for one terminal causes a transmission from that one terminal to be received at another terminal overlapped in time with a receive time slot allocated for the other terminal, then those two terminals are spaced apart in distance, such that an interference path between the two terminals is negligible” as required by claim 1 or that “when the first and second terminals are spaced apart a predetermined distance, the first terminal transmits to the satellite over the frequency at a same time as the second terminal receives from the satellite over the frequency” as required by claim 10.

Nevertheless, the Office Action cites column 7, lines 48-55 of Haartsen as disclosing “an additional delay (dT) may be introduced by the transmitter and receiver sections and other processes therefore those two terminals are spaced apart in distance.” This delay at best relates to a delay in a peer-to-peer communication and not a delay in communications between an access point (e.g., a satellite) and two terminals. Additionally, this disclosure of an additional delay does not involve spacing apart two terminals when the transmit time slot for one terminal causing a transmission from that one terminal to be received at another terminal overlapped in time with a receive time slot allocated for the other terminal as required by claim 1. In fact, there is no discussion of an overlap in time between the transmission from one terminal to a satellite and the reception by another terminal from a satellite.

Similarly, regarding claim 10, the additional delay disclosed by Haartsen does not disclose or suggest that “when the first and second terminals are spaced apart a predetermined distance, the first terminal transmits to the satellite over the frequency at a same time as the second terminal receives from the satellite over the frequency.” Again, there is no disclosure or suggestion of spacing apart two terminals that communicate with an access point, such as a satellite. Nor is there any disclosure or suggestion of the first terminal transmitting at the same time that the second terminal is receiving.

Accordingly, even if one skilled in the art were motivated to combine Noerpel and Haartsen, the combination would not disclose or suggest all of the elements of Applicants’ claims.

Because one skilled in the art would not have been motivated to combine Noerpel and Haartsen to result in a TDD/TDMA satellite communication system and the combination of Noerpel and Haartsen does not disclose or suggest spacing apart terminals as required by Applicants’ claims, the combination cannot render Applicants’ claims obvious.

Regarding claim 3, the Office Action relies upon column 7, line 65-column 8, line 4 of Noerpel as disclosing that “alternate time slots at the satellite are used for transmission and reception.” This section of Noerpel discloses that different spot beams use different receiving time frame windows. It does not, however, mention the use of alternate time slots at the satellite for transmission

and reception as required by claim 3. Thus, the combination of Noerpel and Haartsen does not render dependent claim 3 obvious for this additional reason.

Regarding claim 4, the Office Action relies upon column 5, lines 42-55 of Haartsen as disclosing that “the terminals use navigational information to estimate their propagation delay to the satellite; and thus to determine the time required to transmit into an allocated time slot.” This section of Haartsen discusses voice coding but is completely silent with respect to the use of navigational information or the estimation of propagation delay. Thus, the combination of Noerpel and Haartsen does not render dependent claim 4 obvious for this additional reason.

Regarding claim 5, the Office Action cites Fig. 12 and column 10, lines 21-36 of Haartsen¹ as disclosing that “the satellite transmits ephemeris data to the terminals to aid in determining the propagation delay.” The cited section of Haartsen discusses eliminating gaps and overlaps in voice transmission but is completely silent with respect to ephemeris data. Thus, the combination of Noerpel and Haartsen does not render dependent claim 5 obvious for this additional reason.

Regarding claim 6, the Office Action relies upon column 8, lines 56-62 of Noerpel as disclosing that “the position of each terminal is determined by the satellite, using location data provided by each terminal.” This section of Noerpel discusses the user terminal calculating a propagation delay differential based on

¹ The Office Action’s citation to these passages in Noerpel appear to be a typographical error because Noerpel does not include a figure 12 and the cited text does not appear to be relevant to the use of ephemeris data.

the location of the user terminal but is completely silent with respect to a satellite determining the position of a terminal using location data provided by a terminal. Thus, the combination of Noerpel and Haartsen does not render dependent claim 6 obvious for this additional reason.

Regarding claim 7, the Office Action relies upon column 8, line 56-column 9, line 5 of Noerpel as disclosing that “downlink timeslots are allocated to terminals at random.” This section of Noerpel discusses the user terminal delaying its transmission but is completely silent with respect to random allocation of downlink timeslots. In fact, the transmission from the user terminal to the satellite is an uplink transmission and not a downlink transmission as required by claim 7. Thus, the combination of Noerpel and Haartsen does not render dependent claim 7 obvious for this additional reason.

Regarding claim 8, the Office Action relies upon Fig. 7 of Noerpel as disclosing that “uplink timeslots are allocated in order to avoid a transmission at one terminal being received by another terminal at a time for which the other terminal has been allocated a receive time slot.” Fig. 7 of Noerpel illustrates the propagation delay for user terminals located at different geographic regions but does not disclose or suggest allocating uplink timeslots “to avoid a transmission at one terminal being received by another terminal at a time for which the other terminal has been allocated a receive time slot.” Thus, the combination of Noerpel and Haartsen does not render dependent claim 8 obvious for this additional reason.

Regarding claim 9, the Office Action cites the reasoning provided in the rejections of claims 1-8 as disclosing the elements of this claim. This reasoning does not, however, disclose or suggest the elements of claim 9.

Regarding claim 11 the Office Action relies upon column 3, lines 36-39 of Haartsen as disclosing “receiving, by the satellite, location information from the first and second terminals, wherein the received location information is used for determining whether the first and second terminals are spaced apart the predetermined distance.” This section of Haartsen discusses a ring buffer but is completely silent with respect to the use of received location information to determine whether the first and second terminals are spaced apart the predetermined distance navigational information. Thus, the combination of Noerpel and Haartsen does not render dependent claim 11 obvious for this additional reason.

Regarding claim 12 the Office Action relies upon column 7, lines 52-55 of Haartsen as disclosing that “the plurality of time slots are arranged into a plurality of frames, each of the plurality of frames having a duration less than a duration of a round trip propagation delay between at least one of the plurality of terminals and the satellite.” This section of Haartsen discusses a round trip delay but does not disclose or suggest arranging time slots into frames and that “each of the plurality of frames having a duration less than a duration of a round trip propagation delay between at least one of the plurality of terminals and the

satellite.” Thus, the combination of Noerpel and Haartsen does not render dependent claim 12 obvious for this additional reason.

For at least those reasons set forth above, it is respectfully requested that the rejection of claims 1-12 for obviousness be withdrawn.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket # 038819.57537US).

Respectfully submitted,

January 4, 2010

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